However, on getting the kites up, they easily communicated from De Aar to Orange River, over a distance of some seventy miles. I am glad to say that, from later information received, they have been able to obtain poles, which although not quite high enough for long distances are sufficiently useful. We have also sent a number of Major Baden-Powell's kites, which are the only ones I have found to be of real service.

Stations have been established at Modder River, Enslin, Belmont, Orange River, and De Aar, which work well and will be invaluable in case the field telegraph line connecting these positions should be cut by the enemy.

It is also satisfactory to note that the military authorities have lately arranged to supply small balloons to my assistants for portable installations on service waggons.

While I admire the determination of Mr. Bullocke and our assistants in their endeavour to do the very best they could with most imperfect local means, I think it only right to say that if I had been on the spot myself I should have refused to open any station until the officers had provided the means for elevating the wire, which, as you know, is essential to success.

Mr. Bullocke and another of our assistants in South Africa has been transferred with some of the apparatus to Natal to join General Buller's forces, and it is likely that before the campaign is ended wireless telegraphy will have proved its utility in actual warfare. Two of our assistants bravely volunteered to take an installation through the Boer lines into Kimberley; but the military authorities did not think fit to grant them permission, as it probably involved too great a risk.

What the bearing on the campaign would have been if working installations had been established in Ladysmith, Kimberley and Mafeking, before they were besieged, I leave military strategists to state. I am sure you will agree with me that it is much to be regretted that the system could not be got into these towns prior to the commencement of hostilities.

I find it hard to believe that the Boers possess any workable instruments. Some instruments intended for them were seized by the authorities at Cape Town. These instruments turned out to have been manufactured in Germany. Our assistants, however, found that these instruments were not workable. I need hardly add that as no apparatus has been supplied by us to any one, the Boers cannot possibly have obtained any of our instruments.

I have spoken at great length about the things which have been accomplished. I do not like to dwell upon what may, or will, be done in the immediate or more distant future, but there is one thing of which I am confident—viz. that the progress made this year will greatly surpass what has been accomplished during the last twelve months; and speaking what I believe to be sober sense, I say, that by means of the wireless telegraph, telegrams will be as common, and as much in daily use, on the sea as at present on land.

THE AIR MOVEMENT AT SIMLA AND IN THE WESTERN HIMALAYAS.[1]

IT will generally be admitted that the Meteorological Reports that are issued from time to time by the Indian authorities possess two very valuable features. The work is thorough in its execution, and the result derived is interesting. The present discussion of the air movement at Simla and in the Western Himalayas does not, in either novelty or importance, fall behind the other memoirs which have preceded it, although it presents only a portion of the full investigation, which, when complete, will embrace a similar discussion of the observations made at Darjeeling, a station as characteristic of the Eastern Himalayas, as Simla is of the Western. Two circumstances contribute to the interest attaching to this special inquiry. One is, that our knowledge of the behaviour of the winds in mountain areas is somewhat limited, both on the practical and theoretical side: consequently, a thorough study is particularly welcome. The other is the suitableness of the situation for such an inquiry, since the phenomena can exhibit themselves here on a large scale, and the influence of minor interfering effects be much eliminated. In Indian meteorology we have to deal with large masses of air, subject to periodic laws and partaking of the general movement of the air at the earth's surface. In this particular instance, we have the Indo-Gangetic plain stretching from the North Punjab to East Bengal, some 1350 miles long, and 200 miles in average breadth. The whole of this area is below 1000 feet in elevation, and probably averages barely 400 feet above the sea. From this plain the outer ranges of the Himalayas rise with remarkable abruptness over nearly the whole length. On the northern side, by way of contrast, we have the elevated tableland of Thibet, of which a considerable portion exceeds 14,000 feet in elevation, constituting the great protuberance above the general level of the earth's surface, of which the Himalaya and Karakoram mountains are nothing but the northern and southern borders. In this noble theatre and laboratory, the movements of the air peculiar to mountain areas can be studied with effect, and yet, by some strange perversity, the subject has been neglected. The knowledge which we have gained, and which is repeated in text-books, has unfortunately been derived from wind registers which were either not continuous in their action, or from which partial extracts have been made. The records selected for discussion were made at 8 and 10 a.m. and 4 p.m., consequently, the effect of the night winds, accompanying a fall of temperature, did not come within the scope of investigation. Moreover, the stations chosen for the anemometric instruments represented the characteristics of the air movement across the lower mountain ranges and not the local up and down movements in the deep valleys which lie between these ranges. It is therefore not surprising that the results derived from so partial a source need corrections, or that the accounts given by travellers through these districts, limited as they necessarily are to certain seasons of the year, do not adequately represent the whole of the observed phenomena.

In the opening pages Mr. Eliot briefly reviews the state of our knowledge, and sketches the work of his predecessors in office. The conclusions derived from this haphazard and intermittent kind of observation were to the effect that southerly winds prevail throughout the whole year at the Himalayan hill stations, indicating that in the south-west monsoon the lower air current extends to these elevations; whereas, in the cold weather, the air current giving these winds is the upper movement complementary to the north-westerly winds at the level of the plains. Moreover, the records indicated that the air movement is strongest in the Western Himalayas from January to April, and is feeblest during the monsoon period from June to September. To these statements, which have been frequently quoted, Sir Richard Strachey added, from his own experience and observation, that the most important feature of the air movement in the Western Himalayas was the up and down valley winds, blowing up the valleys during the day from 9 a.m. to 9 p.m. and down them during the corresponding hours of the night.

Mr. Eliot deals with these statements in the first series of tables founded on the records of a large Beckley anemometer, not particularly described. He gives the number of winds recorded under each of eight points of the compass for portions of the years 1893–1896, and derives the constants of the well-known Besselian formula representing the diurnal variation of the winds. The result is to show that the mean monthly air movement is in January and February approximately S.E., and for the remainder of the year is N. 46° E. as opposed to S. 61° W. from the partial records already referred to. Other deductions which come out of this preliminary inquiry show that the air movement is least during the rainy season of July and August, greatest from January to May, and that, since the mean movement is almost as great in January and February as in the hot weather months, it is not a function of the temperature. Mr. Eliot sums up the general conclusions in the following terms:—"The air moment at Simla varies slightly in strength throughout the year, but has two well-marked maxima and minima, in no way related directly to the seasons or to the air movement over the plains in Northern India. These facts alone constitute a strong proof of the inference that the air movement over the Himalayan area is a unique system, independent of the general air movement over the plains in Northern India, and dependent on local conditions and features."

Neither does the *diurnal* variation of the wind, whether in velocity or rotation, partake of that simple character which has been ascribed to it, but within a limited space it is not easy to summarise the results of the analysis applied. For Mr. Eliot

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[1] "Indian Meteorological Memoirs; being occasional discussions and compilations of meteorological data relating to India and the neighbouring countries." Vol. vi., Part 5. (Published by order of H.E. the Viceroy and Governor-General of India in Council, under the direction of John Eliot, M.A., F.R.S., C.I.E., Calcutta, 1899.)

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not only discusses the broad effects of great seasonal changes, but considers the minuter variations noticeable month by month. Still unsatisfied and fearing that some effects are masked by the fallacious system of averages, into which occasional and irregular disturbances can enter with perplexing and even misleading effect, he finally studies the air movement during normal days in each of the characteristic weather periods that mark the climate of India. In this way, and in this way only, does it seem possible to assign a correct physical interpretation to the various types of air movements that are shown to exist. It is impossible to read this section without acknowledging the presence of a master hand, in the closeness of the reasoning, in the clear marshalling of facts, and in the accuracy of the deductions.

The broad result is to show that there is an upward movement during the day hours from about 8 a.m. to 5 p.m., giving southerly winds with more or less westing, and having their maximum intensity at 2 p.m., and a downward movement during the remaining hours, giving northerly winds with more or less easting. A comparison of the barometric readings, at the hill and plain stations respectively, shows that this observed transfer of air (from hills to plains by night, and plains to hills by day) is accompanied by a similar transfer in the opposite directions in the upper strata of the atmosphere. In other words, there is a complete air circulation between the hills and plains of the Western Himalayas.

From the arrangement of his facts Mr. Eliot passes to a theoretical discussion based on the diurnal variation of the vertical pressure anomalies and of the temperature conditions prevailing in the hills and plains, establishing the existence of horizontal pressure gradients from the plains to the hills in the day hours, and from the hills to the plains in the night time, giving rise to alternating movements, roughly proportional to the diurnal range of temperature in the Punjab plains. The hours at which the gradients disappear are worked out with care, and demonstrate the existence of a see-saw motion. Such alternating movements cannot be without their effect on the temperature and humidity of the air at Simla. In fact, the maximum day temperature over the East Punjab plains mainly determines the maximum day temperature at Simla, while the height of the snow line on the Himalaya range will affect the minimum readings. Into the cloud observations and the humidity conditions we have not space to enter. We can only say that the author leaves untouched no clue that can throw light upon this important feature of day and night alternating currents. The observations at his command do not extend over a very long period, in which it might be expected that disturbances would counteract and destroy each other; but by the careful sifting of the evidence the author has been able to deduce many points of interest, and has left a model which may serve for any future discussion of local air movements.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—An additional year has been granted, in addition to the usual University period of residence, which qualifies for examination in any honour school, to those members of the University who shall have been absent on military service in connection with the war in South Africa.

In a congregation held on February 6, the preamble of the statute instituting the degrees of Doctor of Letters and Doctor of Science was approved, without opposition. By this action the University undertakes to institute these degrees; the exact provisions of the scheme will, of course, be arranged later, but it has been proposed that a candidate for the degree shall submit *published* papers or books containing an original contribution to the advancement of learning or science. (*See* NATURE, vol. lxi. p. 164).

The curators of the University chest are authorised to expend such sums as may be necessary in maintaining the rooms assigned to the new department of geography. A considerable number of students have availed themselves of the opportunities afforded by this new department.

CAMBRIDGE.—The decision of the Senate on the question of remodelling the Mathematical Tripos, is to be taken to-day (February 15). The discussion by means of fly-sheets indicates that the opposition will be strong; but the arguments adduced against the present proposals of the Mathematical Board, point rather to regression towards the old undivided and unlimited examination than to the maintenance of the existing Tripos, with which few persons are perfectly satisfied.

The following have been appointed Electors to the several scientific chairs:—Chemistry, Prof. Dewar; Plumian of Astronomy, Lord Rayleigh; Anatomy, Dr. D. MacAlister; Botany, Zoology, and Agriculture, Sir M. Foster; Geology, Mr. W. H. Hudleston; Jacksonian of Natural Philosophy, Prof. Liveing; Downing of Medicine, Sir T. Lauder Brunton; Mineralogy, Sir G. G. Stokes; Experimental Physics, Prof. Darwin; Engineering, Prof. A. B. W. Kennedy; Physiology, Dr. Gaskell; Surgery, Mr. T. Holmes; Pathology, Dr. L. Humphry; Mental Philosophy, Prof. Sidgwick.

Profs. Liveing, Marshall Ward, Hughes, and Somerville, and Messrs. Warburton, Widdicombe, Adie, and McCracken, have been appointed examiners for the Diploma in Agricultural Science.

BY the will of the late Mr. W. Hiddingh, who died on December 10, 1899, the University of the Cape of Good Hope is bequeathed the sum of 5000*l.* for the foundation of a scholarship to enable young persons to pursue and complete a course of professional study, the scholarship to be tenable for four years. The University is also bequeathed the sum of 25,000*l.* for the purpose of building a university hall and suitable university offices, and a large piece of ground for the site of the building. The South African College will receive the sum of 10,000*l.* for the erection of a students' building.

IT appears from a return just published that the amount expended on technical education, exclusive of the sums allocated to intermediate and technical education under the Welsh Intermediate Education Act, was in 1897–98 860,104*l.*, and the estimated total expenditure during the year 1898–99 was 874,611*l.* The amounts raised by loan on the security of the local rate under the Technical Instruction Acts were—in 1897–98 69,333*l.*, and in 1898–99 133,583*l.* The total amount of the residue received under the Local Taxation (Customs and Excise) Act by the councils of counties and county boroughs in England, excepting Monmouth, in respect of the financial year 1897–98 was 834,826*l.*, of which 759,400 was appropriated to educational purposes, and 75,426*l.* to the relief of rates, the latter sum including 42,108*l.* devoted by the London County Council, to relief of the rates. Of the forty-nine counties forty are applying the whole of the residue, and nine a part of it, to technical education. The total of the residue paid to the thirteen county councils and the councils of three county boroughs in Wales and Monmouth was 40,061*l.*, and these local authorities are devoting the whole of it to intermediate and technical education under the Welsh Intermediate Act, 1889. In the case of Ireland the residue is not applicable to technical education. Twelve local authorities expended on technical education during the year 1897–98 5649*l.*, and the estimated total expenditure by them during 1898–99 was 4523*l.*

THE Massachusetts Institute of Technology is well known to be among the foremost educational institutions in the United States. The "Annual Catalogue," for 1899–1900, which has just been received, is an instructive volume for any one interested in the methods of technical education followed in America. The equipment of this Institute accords with the view that the foundation of all sound technological education requires, not only thorough theoretical training, but also prolonged, well-directed laboratory drill which shall first give the student the power of close and accurate observation, and then bring him into direct contact with the material problems of his future profession. The laboratories of the Institute are numerous and extensive, the Kidder laboratories of chemistry affording accommodation for more than six hundred students; their equipment is correspondingly ample, and is kept well up to the rapid advances in technical practice. Provision is made for exact general training in the problems of physics and chemistry, for highly specialised work in these and other sciences, and for engineering tests and processes on a practical scale. Great importance is attached to the study of mathematics, both as a means of mental discipline, and as affording a necessary basis for further instruction in the engineering and other courses. The instruction in applied chemistry includes the use of text- and reference-books in both

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